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(54) Supplying fuel/air mixture

(57) An apparatus for supplying a pre-mixed fuel/air mixture to a burner, e.g. of a water-heating boiler, comprises a rotary variable-speed air impeller (2) driven at a speed which varies with the demand for heat from the burner, a variable-aperture fuel valve (7) for delivering fuel into the air entrained by the impeller, and a centrifugal control device (3, 4, 5) mounted on the impeller, comprising centrifugal weights (4) acting through levers (3, 5) and thrust means (6, 61) on the fuel valve (7) against a spring (62), to vary the fuel valve opening in dependence on the impeller speed and hence on the rate of air flow.

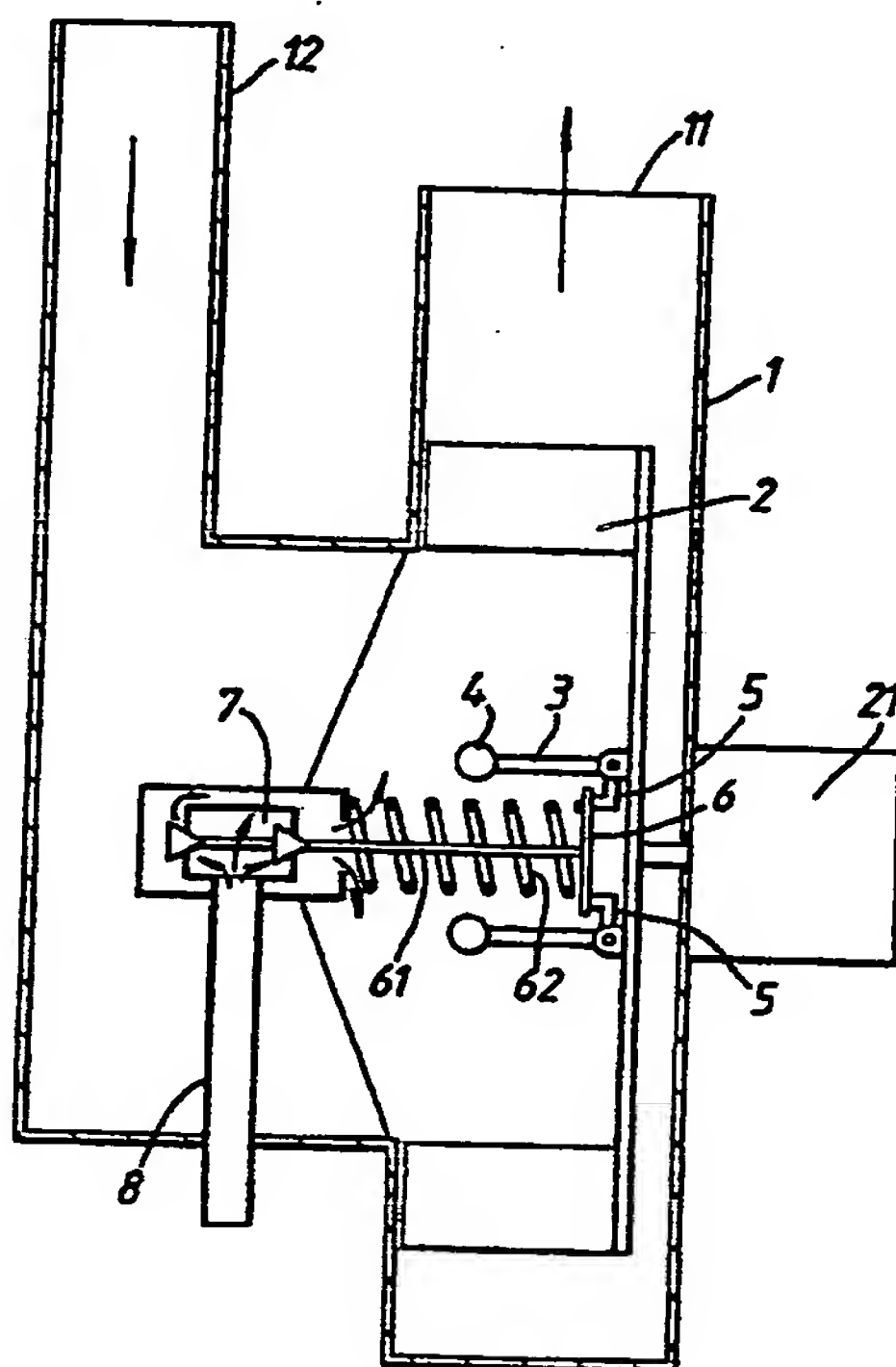


Fig.1

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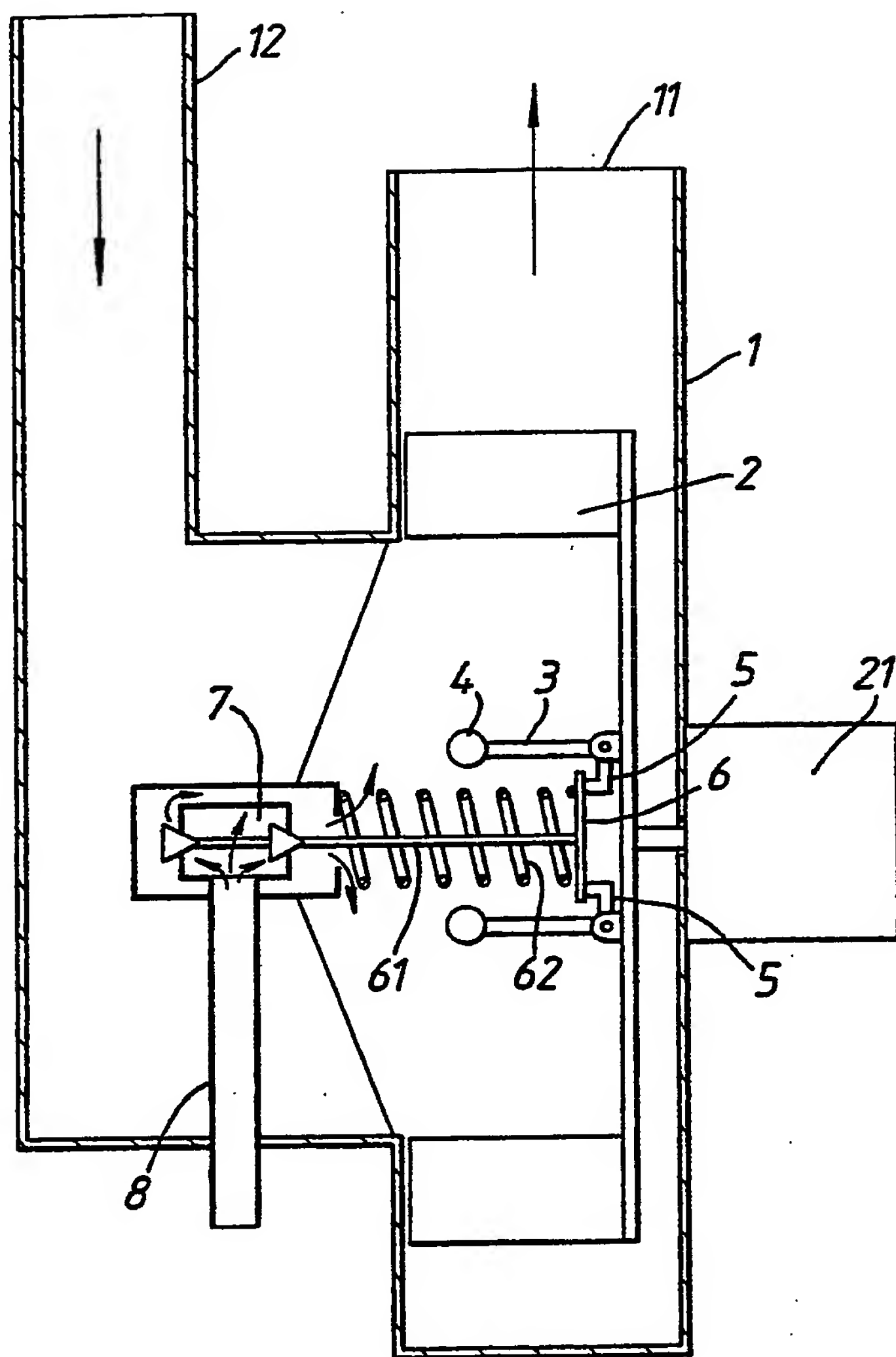


Fig. 1

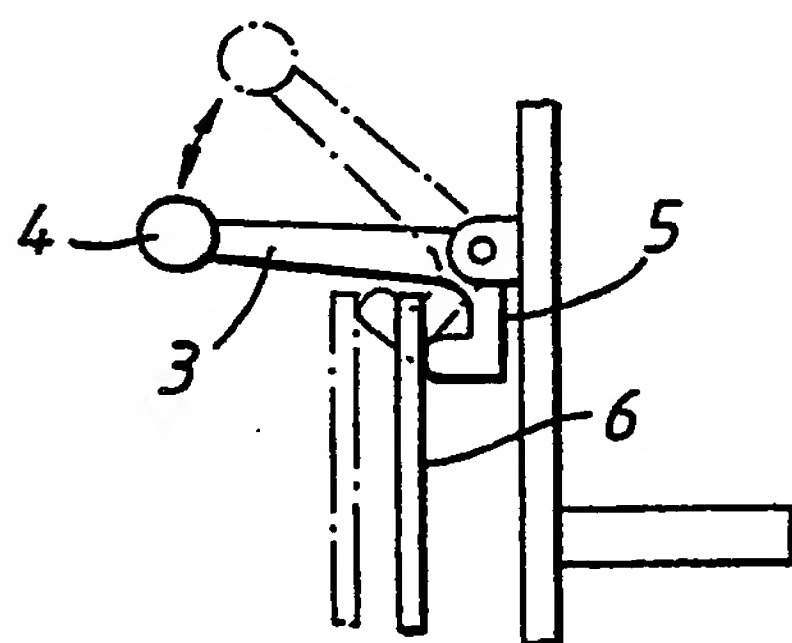


Fig. 2

APPARATUS FOR SUPPLYING A FUEL/AIR MIXTURE

This invention relates to apparatus for supplying a fuel/air mixture to a burner, e.g. of a water-heating boiler for a domestic hot water or central heating system.

It has recently been recognised to be advantageous to use burners which are fed with a premixed fuel/air (e.g. gas/air) mixture and produce very short flames, and to cope with varying demands for heat by varying the supply of fuel rather than by switching the burner on and off as was previously the practice. The correct proportions of fuel and air in the mixture supplied to the burner must be maintained despite variation in the rate of supply. This requires that variations in the rate of flow of each constituent must be simultaneous. Furthermore the means for maintaining the correct proportions must be reliable and conform to statutory safety requirements.

Mechanical gas/air mixers have been devised for this purpose, in which air is supplied at a constant pressure and the proportions of gas and air are determined by respective restricting elements, surplus air being dumped out of the system with consequent problems over disposal of the dumped air. Alternatively electronic flow detecting and measuring devices may be used, but this involves use of relatively expensive electronic means for ensuring maintenance of the correct proportions of fuel and air.

The object of the invention is to provide relatively simple, inexpensive but reliable means for ensuring supply of the correct proportions of fuel and air at varying rates of delivery.

According to the invention, there is provided an apparatus for supplying a fuel/air mixture to a burner, e.g.

of a water-heating boiler, comprising a rotary variable-speed air impeller arranged to be driven at a speed which varies with the demand for heat from the burner, and a variable-aperture fuel valve for delivering fuel into the air entrained by the impeller, wherein a fuel delivery control device is mounted for rotation with the rotary impeller and is arranged to cause the fuel valve aperture to be varied progressively in dependence on the rotational speed of the impeller. Variation of the fuel supply is thus effected simultaneously with variations in the air flow. Since the rate of air flow is proportional to the impeller speed, the correct proportions of fuel and air can be maintained in a simple and reliable manner.

Preferably the fuel delivery control device is actuated by centrifugal force. For example, it may comprise weights pivotally mounted on the rotary impeller so that centrifugal force causes the weights to fly outwards on rotation of the impeller. The weights may each be secured to one end of a respective bell-crank lever pivoted on the rotary impeller, the other end of each bell-crank lever acting on an operating member of the fuel valve against a spring. Other forms of centrifugally actuated device may alternatively be used, such as a conventional engine governor employing centrifugal weights connected to two rotary members so as to draw them together as the weights fly outwards.

An embodiment of the invention will now be described in more detail by way of example and with reference to the accompanying drawings, in which:

Figure 1 is a diagrammatic axial section through an apparatus for supplying a gas/air mixture, and

Figure 2 is a detail view of a centrifugal control element of the apparatus.

(3)

As shown in Figure 1, the apparatus comprises a fixed fan casing 1 having an outlet 11 for the gas/air mixture and containing a rotary impeller 2 arranged to be driven by a motor 21 at a speed dependent on the demand for heat from a burner (not shown) to which the gas/air mixture is delivered from the outlet 11. Air is supplied to the fan casing 1 through an inlet passage 12.

Bell-crank levers 3 carrying weights 4 at their outer ends are pivotally mounted on the rotary impeller 2 so that on rotation of the impeller, centrifugal force will cause the weights to move outwards as shown in chain lines in Figure 2. The inner, shorter, arms 5 of the bell-crank levers 3 are in contact with a thrust plate 6 connected by a thrust rod 61 to a variable-aperture fuel valve 7. A compression spring 62 acts on the thrust plate 6 to urge it to the right in Figure 1, i.e. in the direction to close the valve 7. Fuel gas is supplied to the valve 7 through a pipe 8.

On rotation of the impeller 2, the weights 4 move outwards and the arms 5 consequently move to the left, forcing the thrust plate 6 to the left as shown in Figures 1 and 2, against the action of the spring 62. The thrust rod 61 thus opens the fuel valve 7 progressively in dependence on the rotational speed of the impeller 2. The rotational speed of the motor 21, which drives the impeller 2, is controlled by known means (not shown) in dependence on the demand for heat from the burner. The gas and air supplies are thus varied simultaneously and the correct proportions of gas and air can be simply and reliably maintained.

CLAIMS:

1. An apparatus for supplying a fuel/air mixture to a burner, e.g. of a water-heating boiler, comprising a rotary variable-speed air impeller arranged to be driven at a speed which varies with the demand for heat from the burner, and a variable-aperture fuel valve for delivering fuel into the air entrained by the impeller, wherein a fuel delivery control device is mounted for rotation with the rotary impeller and is arranged to cause the fuel valve aperture to be varied progressively in dependence on the rotational speed of the impeller.
2. An apparatus according to Claim 1, wherein the fuel delivery control device is actuated by centrifugal force.
3. An apparatus according to Claim 2, wherein the fuel delivery control device comprises weights pivotally mounted on the rotary impeller so that centrifugal force causes the weights to fly outwards on rotation of the impeller.
4. An apparatus according to Claim 3, wherein the weights are each secured to one end of a respective bell-crank lever pivoted on the rotary impeller, the other end of each bell-crank lever acting on an operating member of the fuel valve against a spring.
5. An apparatus for supplying a fuel/air mixture to a burner, e.g. of a water-heating boiler, substantially as hereinbefore described with reference to the accompanying drawing.